U.S. DEPARTMENT OF ENERGY

SRS

SRS
Occupational Radiation Protection Program

Brief to SRS Citizen Advisory Board

Jack Parker
Health Physicist, Technical Support Division

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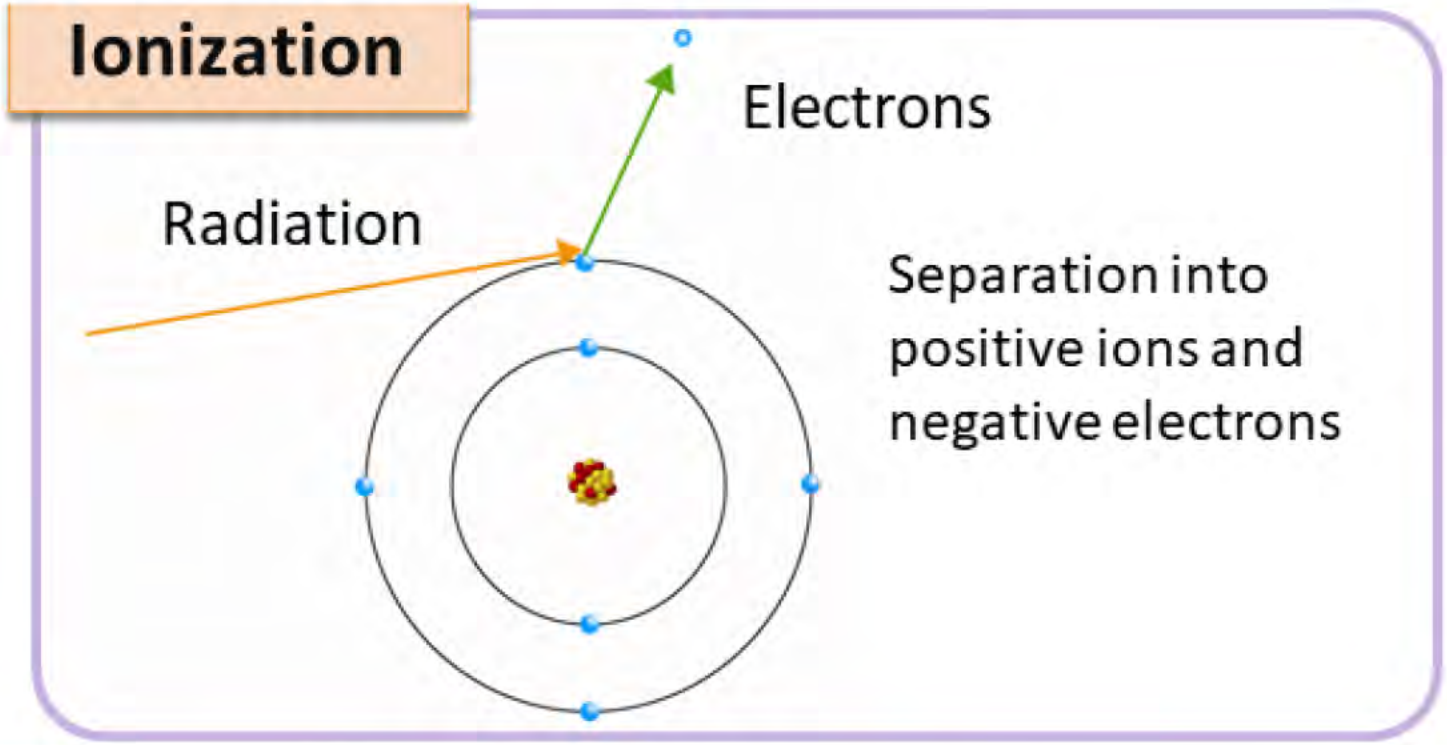
Outline

- Brief introduction of Radiation
- Sources of Radiation
- Radiation at Savannah River Site
- Control of Exposure to Radiation at Savannah River Site

What is Radiation?

Definition:

- Ionizing Radiation
- Particles and electromagnetic waves with sufficient energy to cause ionization.



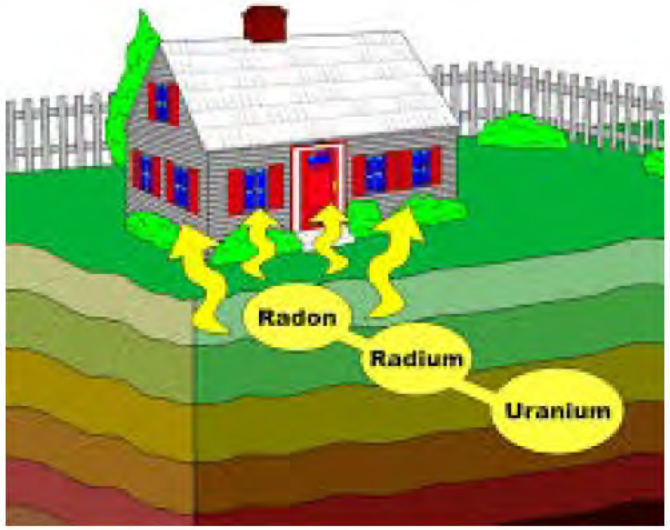
Sources of Radiation

Sources:

– Natural

- Building materials

- Radon



- Cosmos

- Food

Sources of Radiation

Sources:

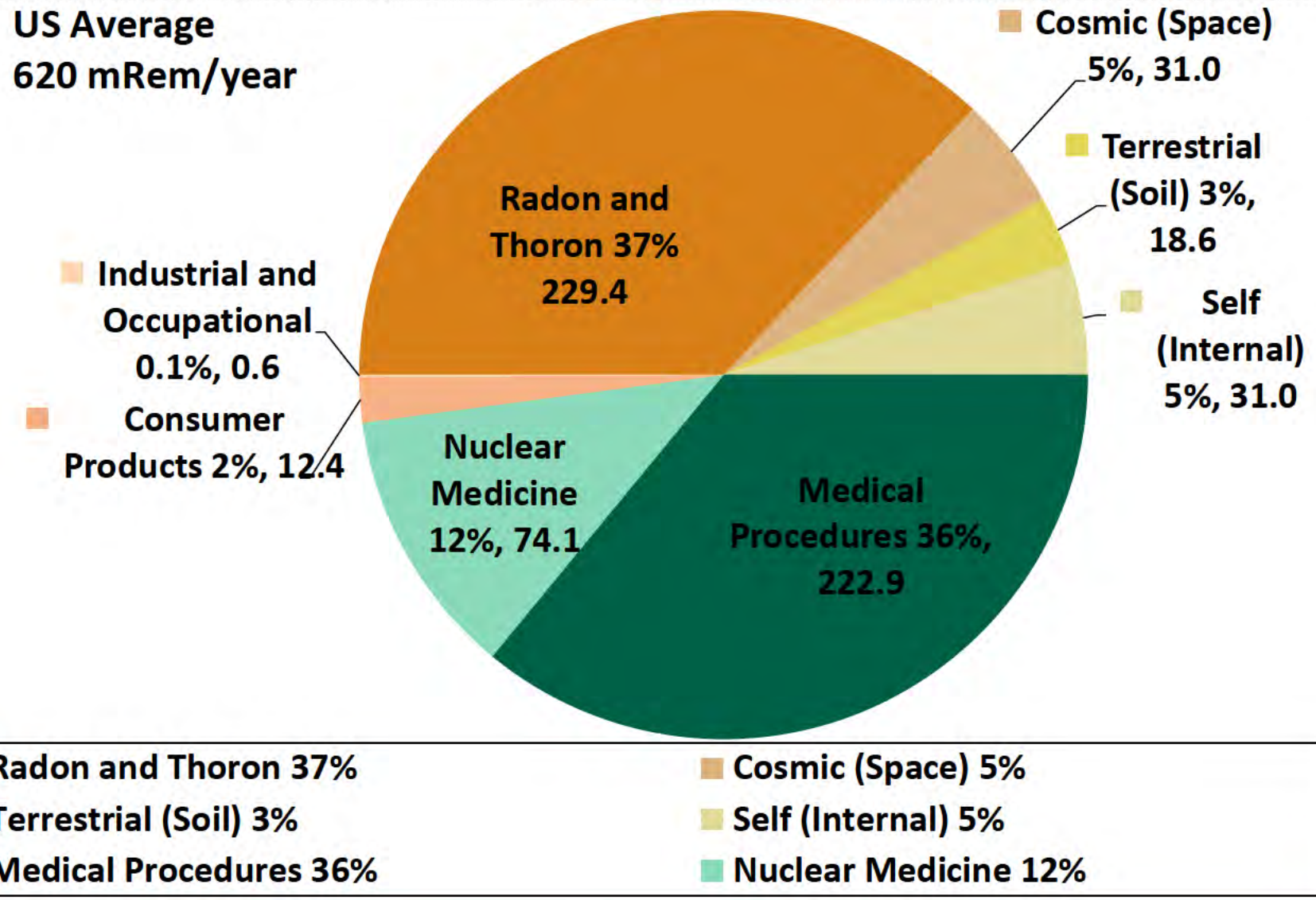
– Man Made

- Medical

- Nuclear energy
- Consumer products, industry

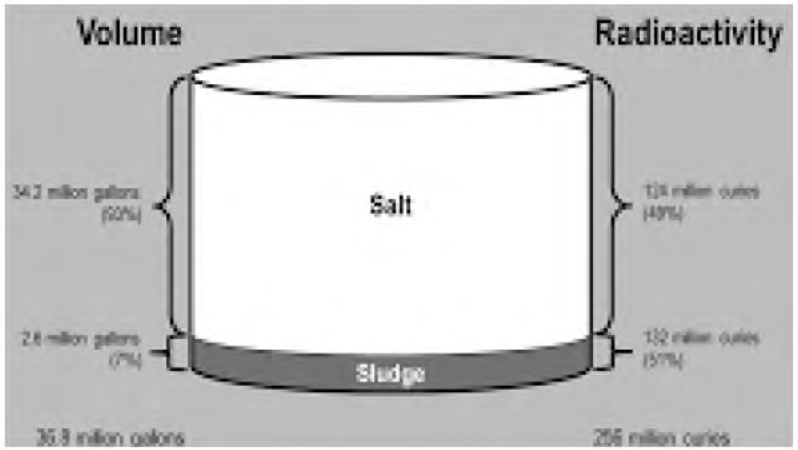
- Fallout

Background Radiation



Sources of Radiation at SRS

Storage, Processing, and Disposal of Liquid Waste and Nuclear Materials



Types of Radiation at SRS

Type	Description	Properties	SRS Source (s)
Alpha (α)	• 2 protons, 2 neutrons • Charge +2 • Mass 4	• Few cm in air • Stopped by paper or skin	Uranium, Plutonium
Beta (β)	• Electron • Charge ±1 • Mass 0.0005	• Several cm in air • Stopped by low density material (aluminum or plexiglass)	Liquid waste
Gamma (γ)	• Photon/EM Wave • Charge 0 • Mass 0	• Meters in air • Stopped by high density material (such as Lead)	Principally liquid waste
Neutron (η)	• Neutron • Charge 0 • Mass 1	• Meters in air • Stopped by concrete, water	Special Nuclear Material

Site's Guiding Principles for Personnel Radiation Exposure

- As Low As is Reasonably Achievable (ALARA) - Control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations.
- Ensure site personnel exposure stays below legal and administrative limits.
- Time, Distance, Shielding.
- No exposure without a benefit.

Radiation Protection at SRS

1) Federal laws and regulations:
   - 10 CFR 835 “Occupational Radiation Protection”

2) DOE Orders and Guidance Documents:
   - DOE O 458.1 “Radiation Protection of the Public and the Environment”
   - DOE-STD-1098 “Radiological Control”
   - DOE G 441.1 “Radiation Protection Programs Guide…”

3) Site Manual
   - 5Q manual and subtier procedures
   - SRIP 441.1

4) Whole body dose limits for radiation workers
   - 5000 mRem/year (regulatory limit)
   - 2000 mRem/year (corporate DOE)
   - 1000 mRem/year (Parsons)
   - 500 mRem/year (SRNS, SRMC, Centerra, SREL contractors)
   - 150 mRem/year (DOE-SR/NNSA-SRFO)
   - 100 mRem/year (regulatory limit for Non-Radiation Worker/Visitor/Public)

SRS Radiation Protection Controls to Minimize Personnel Dose

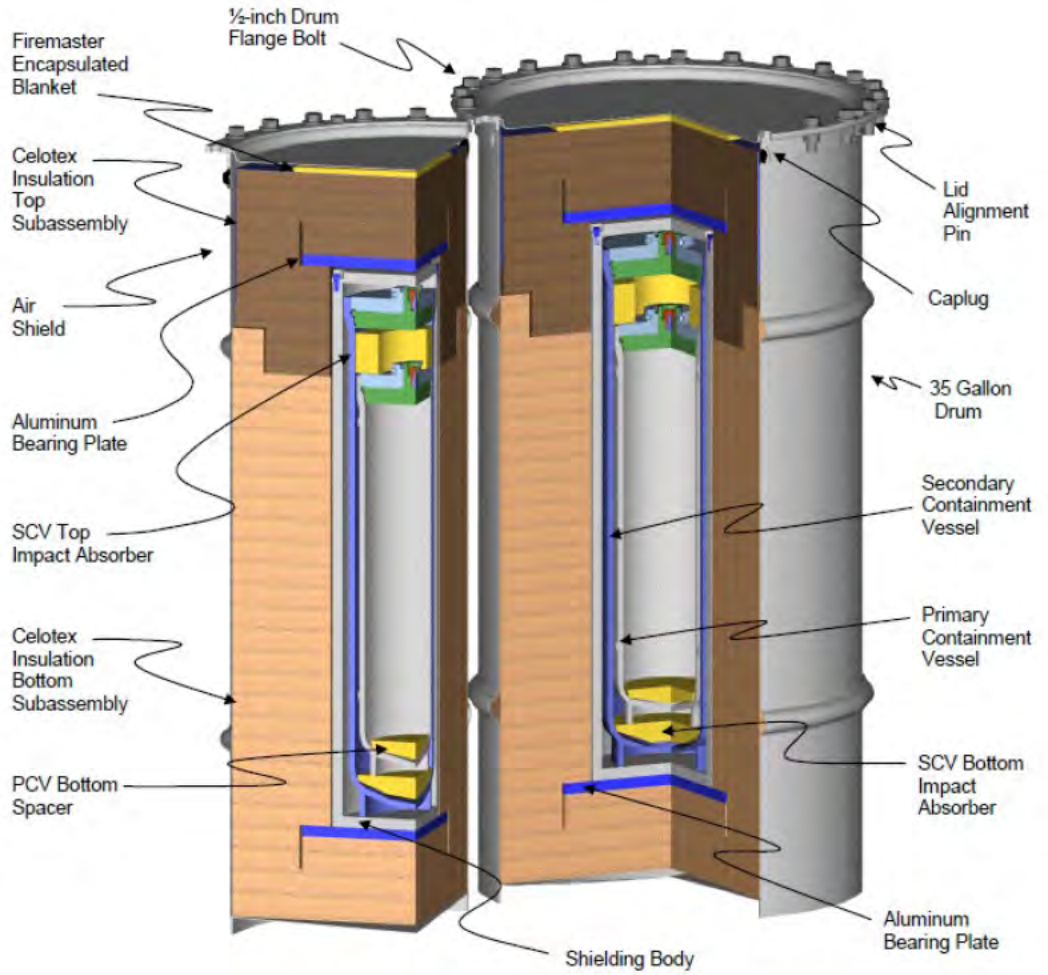
Hierarchy of Controls

- Engineering Controls (EC) (shielding and distance)
- Administrative Controls (AC) (time and distance)
- Personnel Protection Equipment (PPE) (shielding)

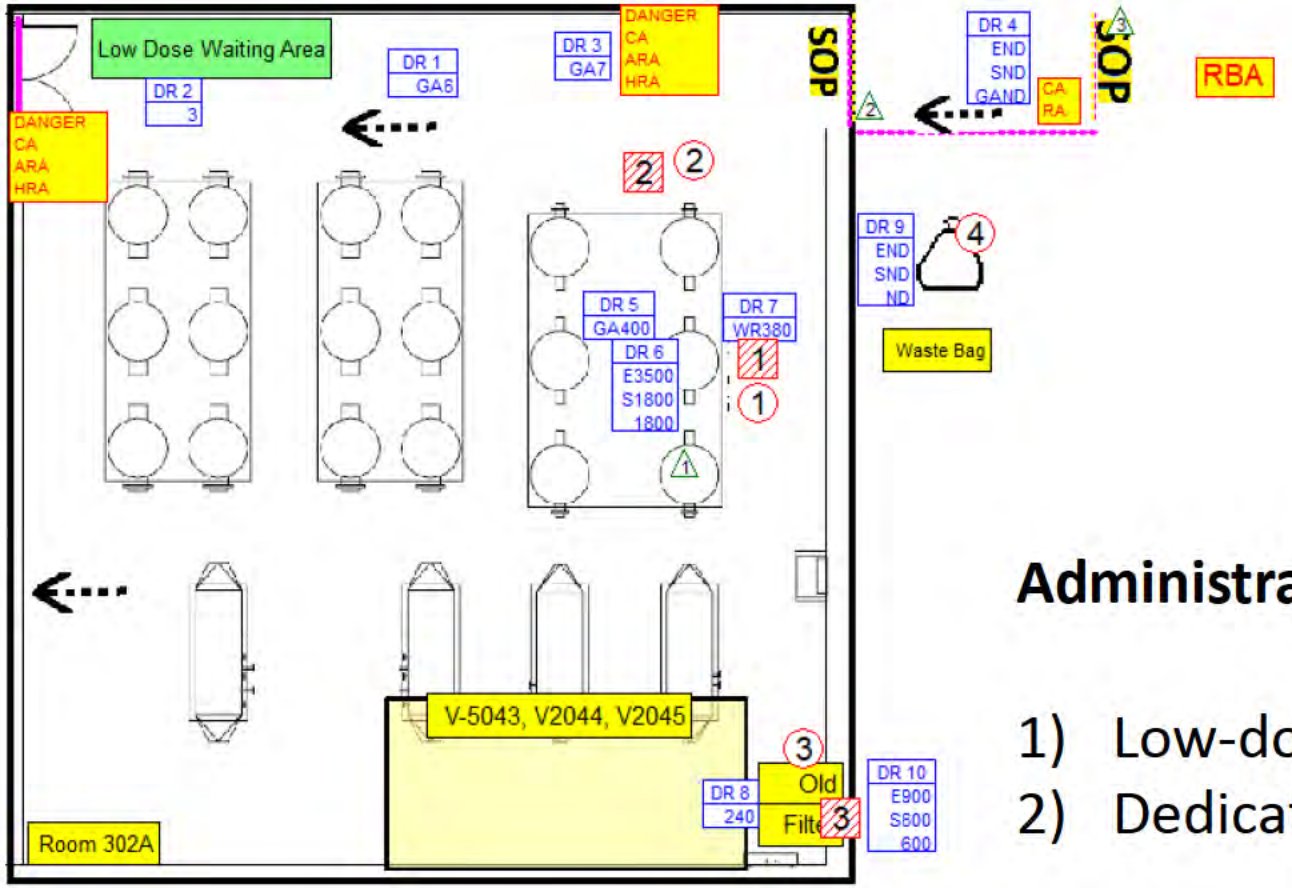
SRS Radiation Protection Controls to Minimize Personnel Dose

Engineering Control

Fabricated shielded containers to hold Pu Material in storage



SRS Radiation Protection Controls to Minimize Personnel Dose



Administrative Controls

1) Low-dose waiting area
2) Dedicated staging area

SRS Radiation Protection Controls to Minimize Personnel Dose

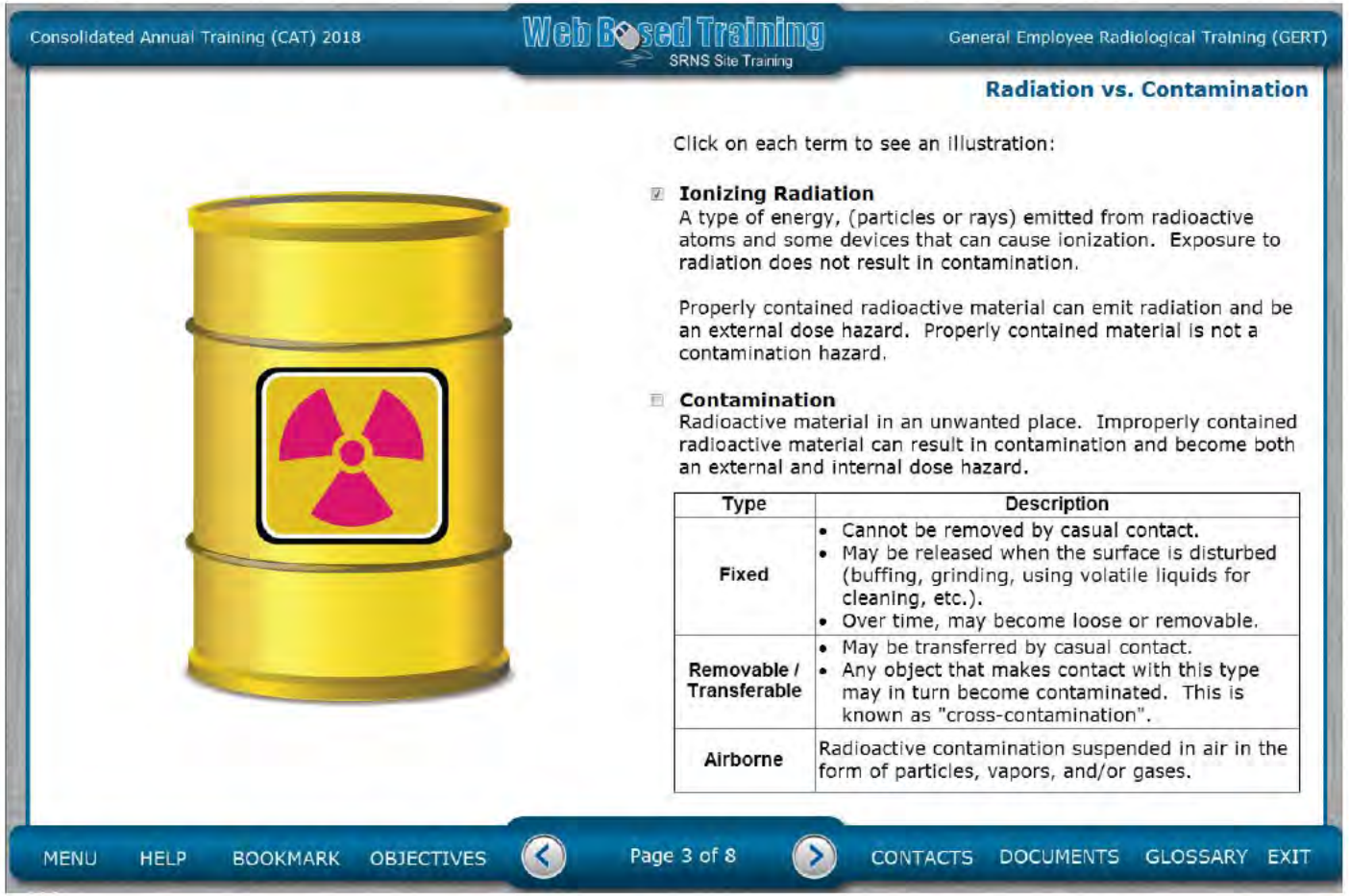
Engineering and Administrative Controls, Personal Protective Equipment

1) Water basin to store Spent Nuclear Fuel (EC)
2) Remote handling tools (EC)
3) Lift material at minimum level (AC)
4) Anti-contamination clothing (PPE)

SRS Radiation Protection Controls to Minimize Personnel Dose

Training commensurate with duties

1) General Employee Radiological Training
2) Radiological Worker Training I
3) Radiological Worker Training II
4) Other specialized training



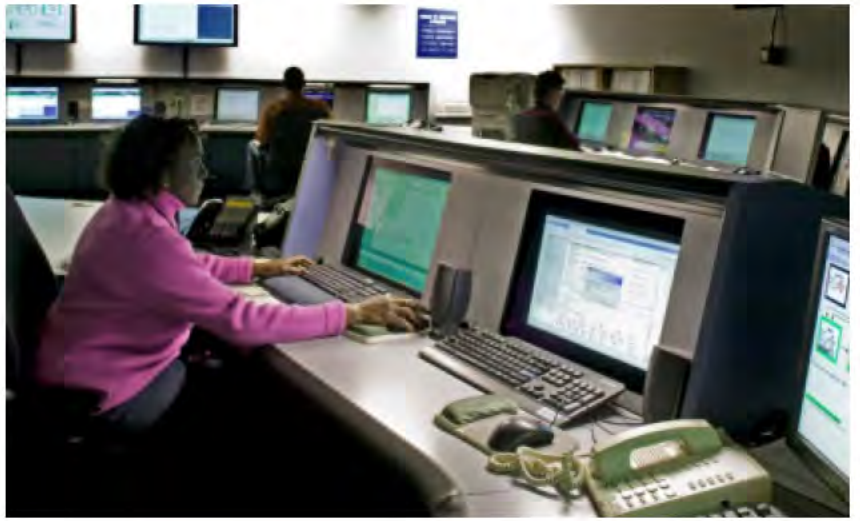
SRS Radiation Protection Controls to Minimize Personnel Dose

Postings and barricades:

SRS Radiation Protection Controls to Minimize Personnel Dose

Monitoring

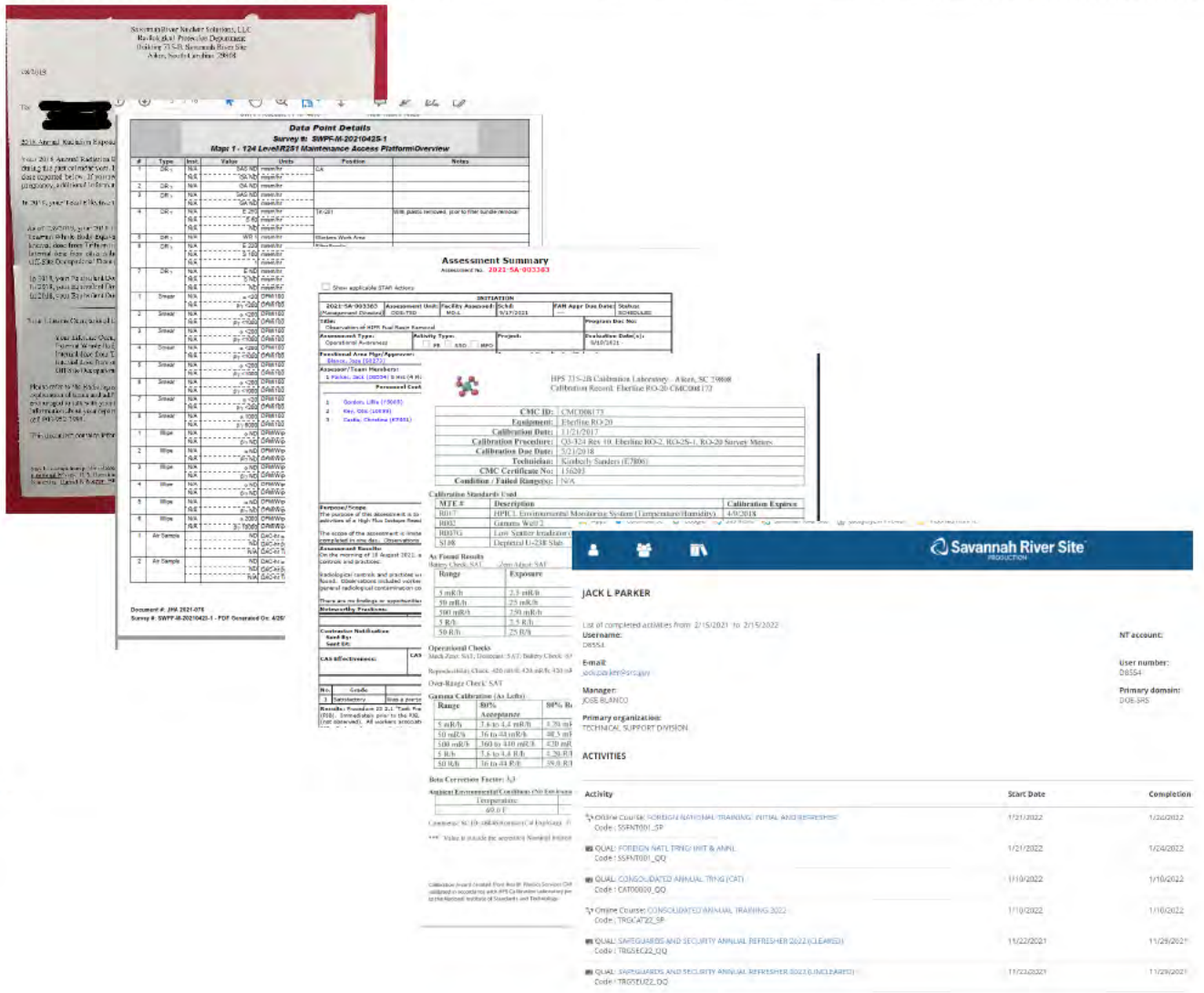
- Personal Dosimeters
- Bioassays
- Area and Airborne Radiation Monitors
- Remote Monitoring
- Contamination Monitors



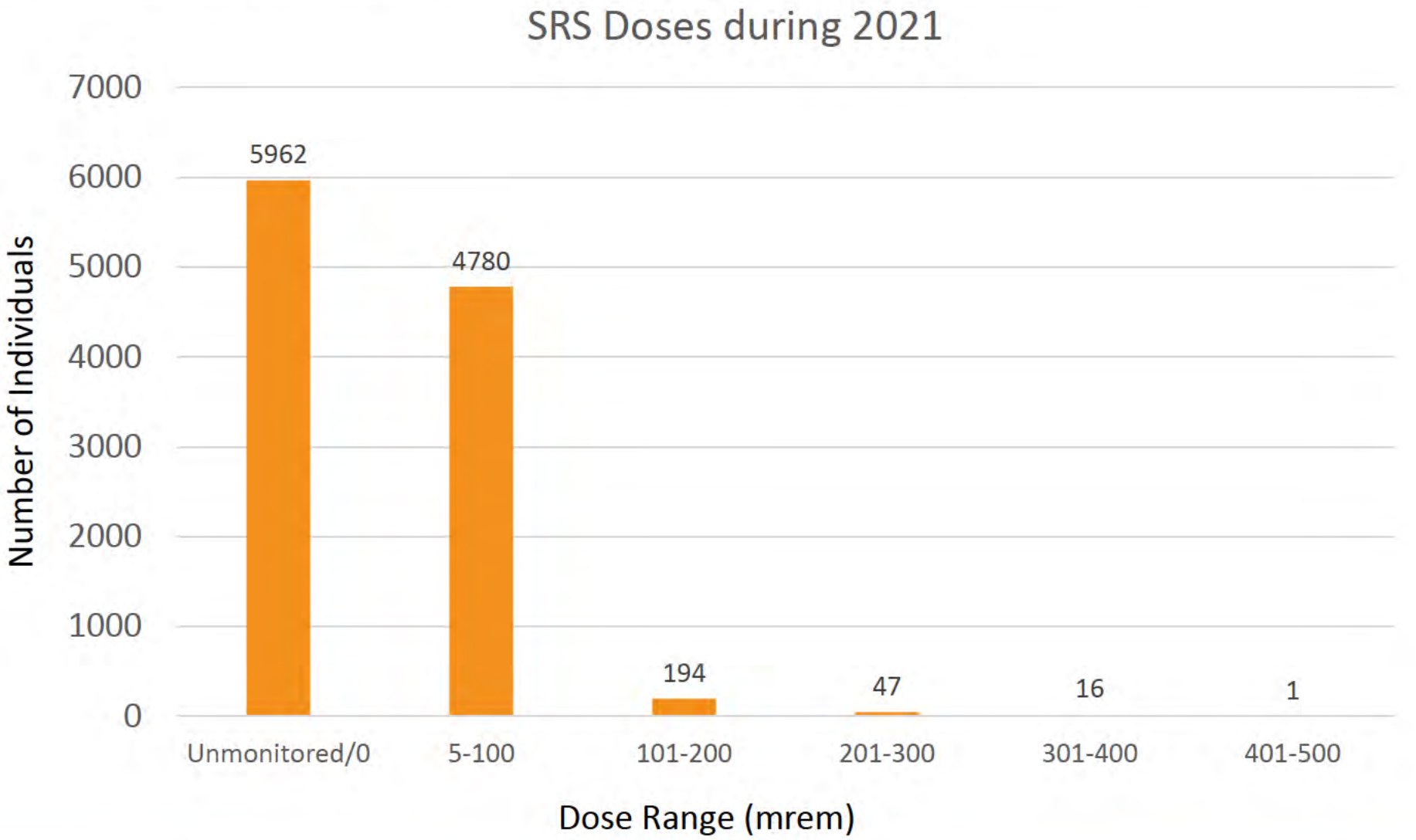
SRS Radiation Protection Controls to Minimize Personnel Dose

Record Keeping

- Maintain Records of Individual Annual and Lifetime Dose
- Training and Qualification Records
- Radiation Survey Records
- Instrument Calibration, Maintenance, Quality Assurance
- Audits



2021 Doses at SRS



Summary

- Radiation exposure at SRS is well understood and easily measurable.
- Numerous engineered and administrative controls are in place to minimize worker exposure.
- Posting and barricades control access to radiation work areas.
- Regular monitoring to characterize and note any changes radiological conditions.
- Worker training/qualification required before they can performance tasks in radiation and nuclear material areas.
- ALARA. No exposure without a benefit.